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Typha orientalis Presl (Typhaceae): a new species record for India

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Abstract: *Typha orientalis* C. Presl (Typhaceae) is recorded for the first time from the Kashmir Himalaya, India.and for the first time in the entire Indian sub-continent. A detailed taxonomic description and photographs of the diagnostic characters are provided to facilitate its identification in the field. Also provided are diagnostic characters used to distinguish *T. orientalis* C. Presl from *T. latifolia* L.

Key words: *Typha latifolia,* Kashmir Himalaya, Indian subcontinent

Typha L. (Typhaceae), or cattails, includes 10 to 15 species and comprises highly productive aquatic weeds (Boyd 1971) and rapid colonizers of disturbed or newly formed wetlands (Steinbachova-Vojtiskova *et al.* 2006). The genus is widely distributed in temperate and tropical regions of the Northern and Southern Hemispheres, existing on all continents except Antarctica (Smith 1987; Kim 2002).

In the Indian subcontinent, four species of *Typha* (*T. angustata* Bory & Chaub., *T. elephantina* Roxb., *T. javanica* Schnizl. and *T. laxmannii* Lepech.) have been reported (Hooker 1893). Saha (1968) reported 4 species from India, which include *T. angustata, T. elephantina, T. latifolia* and *T. laxmannii,* of which the first two occur throughout India while the other two are restricted to Kashmir, Punjab, Deccan and probably Gujarat. Cook (1996) recorded five species (*T. latifolia, T. laxmannii, T. minima, T. domingensis* [= *T. javanica*] and *T. elephantina*) from India. Of these, *T. latifolia, T. laxmannii* and *T. minima* are restricted in distribution to Western Himalayan part in India. Kaul and Zutshi (1967) recorded only *T. angustata* from the wetlands of Srinagar, India. Stewart (1972) recorded 3 species of the genus (*T. angustata* [= *T. domingensis*], *T. elephantina*, and *T. laxmannii*) from the whole of the former Jammu and Kashmir. Kak (1990) reported 3 species (*T. angustata*, *T. elephantina*, and *T. laxmannii*) from Kashmir Himalaya, India.

While carrying out botanical surveys in the Kashmir Valley, full blooming specimens of *Typha* species were collected from the Ganderbal (1,590 m above sea level [a.s.l.]), Gadura (1,590 m a.s.l.), Nigeen Lake (1,595 m a.s.l.), Sundoo (1605 m a.s.l.), Awantipora (1,600 m a.s.l.), Ahansar wetland (1,585 m a.s.l.) Narbal (1,603 m a.s.l.), Shalbugh wetland (1,590 m a.s.l.), Wular Lake (1,645 m a.s.l.). After critical examination of morphological characters, the specimens were identified as *Typha orientalis* C. Presl. Study of the relevant taxonomic literature (Hooker 1893; Kaul and Zutshi 1967; Stewart 1972; Kak 1990; Cook 1996] revealed that this species is previously unreported from India. Therefore, this report represents the first record of *Typha orientalis* C. Presl for the flora of India. A detailed taxonomic description and photographs of diagnostic characters of this species are given here to facilitate its identification in the field and also to validate this new record for India.

Typha orientalis is distributed in China (Anhui,Guangdong, Guizhou, Hebei, Heilongjiang, Henan, Hubei, JiangsuJiangxi, Jilin, Liaoning, Nei Mongol, Shaanxi, Shandong, Shanxi, Taiwan,Yunnan, Zhejiang), Japan, Korea, Mongolia, Myanmar, Philippines, Russia, Australia and now India (Kashmir Himalaya).

The study site was in the Kashmir Valley, situated in northern fringe of the Indian sub-continent between 33°22′ N and 34°50′ N and 073°55′ E and 073°33′ E (Figure 1), covering an area of *ca.* 16,000 km². Standard herbarium methods were followed (Ganie *et al.* 2014).

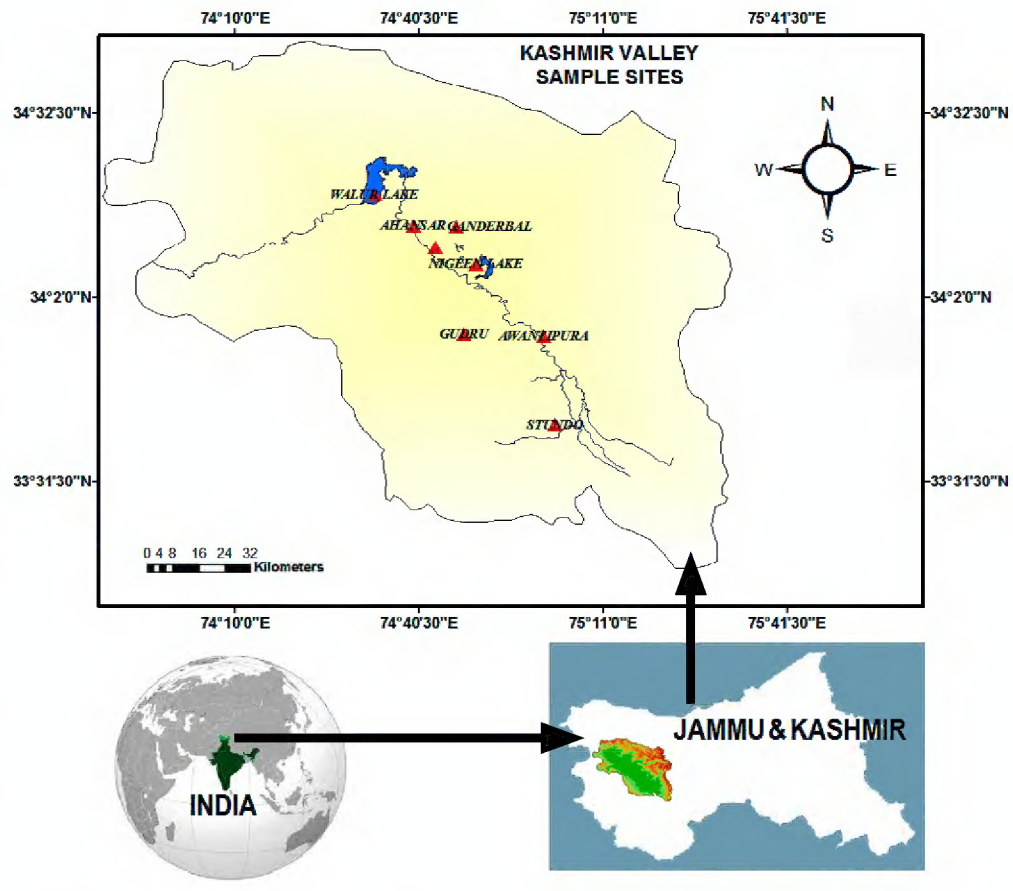

Figure 1. Map of Kashmir Himalaya showing study sites (1, Wular Lake; 2, Ahansar; 3, Ganderbal; 4, Gadura; 5, Shalbugh; 6, Narbal; 7, Nigeen Lake Latpora; 8, Awantipora; 9, Sundoo).

Typha orientalis C. Presl, *Abh. Königl. Böhm. Ges. Wiss.*, ser. 5, 6: 599; *Epimel. Bot.* 239. 1851.
Vernacular (Kashmiri) name: Zab/Peitz

Perennial herb (Figures 2 and 3) up to 270 cm tall; rhizome robust creamish white in colour; stem with nodes and internodes, solid, stout clasped by leaf sheaths; leaves dark green, leaf lamina of lower leaves 140–190 × 2–2.5 cm, and upper leaves 80–155 × 1.3–1.8 cm, leaf sheath of lower leaves 45–110 cm and 45–80 cm of lower leaves, abaxially convex, transverse section semicircular to lanceolate; male and female parts of inflorescence contiguous, male part of spikes 12–17 cm, with 1–3 deciduous bracts at base or occasionally in middle portion and upper portion; female part of spikes 11–24 cm, with 1 deciduous bract at base; male flowers: stamens 3, rarely 2 or 4; anthers *ca.* 3 mm; female flowers without bracteoles; ovary fusiform to lanceolate; stalk 2–2.5 mm, slender; styles 1.5–3 mm; stigmas spatulate, 0.5–0.8 mm; hairs on stalk *ca.* as long as style; fruit elliptic.

Specimens examined: India, Jammu and Kashmir, Ganderbal, 5 June 2014, Aijaz, Rashid and Mehboob 01991 [Kashmir University Herbarium (KASH)]; Gadura-Ganderbal, 5 June 2014, Aijaz, Rashid and Mehboob 01992 (KASH); Nigeen Lake, 7 June 2014, Aijaz, Rashid and Mehboob 01993 (KASH); Sundoo-Anantnag, 15 June 2014, Aijaz, Rashid and Mehboob 01994 (KASH); Awantipora-Pulwama, 20 June 2014, Aijaz, Rashid and Mehboob 01995 (KASH); Narbal-Srinagar, 1 July 2014, Aijaz, Rashid and Mehboob 01996 (KASH), Shalbugh-Ganderbal, 01 July 2014, Aijaz, Rashid and Mehboob 01997 (KASH); Wular Lake 10 July 2014, Aijaz, Rashid and Mehboob 01998 (KASH).

Additional specimens examined (determination of specimens deposited in Kashmir University Herbarium [KASH]): After critical examination of the previous herbarium specimens, it was also found that many specimens of *Typha orientalis* in the Kashmir University Herbarium (KASH), which had been deposited over a period of time were misidentified are given as *T. latifolia*: India, Kashmir: Kishtiwar, 20 July 2007, A.A. Khuroo, Akhtar H. Malik and Z.S. Khan 639; Saidakadal-Nigeen Lake, 13 September 2012, Mahpara 52.

During this study, *Typha orientalis* was collected from Srinagar, Ganderbal, Anantnag, Baramulla, Bandipora and Pulwama districts of the Kashmir Himalaya (Figure 1).

Flowering period: The species are in full bloom during May-July in different aquatic habitats of Kashmir Himalaya.

Fruiting period: It was observed that the species produce fruits during September to October

The taxonomy and systematics of *Typha* is unclear and controversial. This is due to species having very similar gross morphology and a large range of variability in vegetative and reproductive traits that are used to delimit taxa (Smith 1967). Since the early systematic treatment of Kronfeld (1889), several regional revisions have tried to establish taxonomic boundaries between taxa based on morphological traits (Saha 1968; Cook 1980; Sharma and Gopal 1980; Bokhari 1983; Finlayson *et al.* 1985; Kuehn and White 1999; Hamdi and Assadi 2003, Kim *et al.* 2003). Other revisions have focused on particular species complexes (Kuehn *et al.* 1999) or correct taxonomic identification of various species of the genus (Sharma and Gopal 1980).

Morphologically, *Typha orientalis* appears similar to *T. latifolia* because the male and female parts of the inflorescence in both the species are not separated; both species are ebracteolate. Based on the distinguishing characters of the two species (Table 1), both *T. orientalis* and *T. latifolia* occur in Kashmir Himalaya.

In Kashmir Himalaya, the bewildering taxonomy of the genus *Typha* may be resolved in the future by molecular studies.

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Table 1. Morphological comparison between *Typha orientalis* and *T. latifolia.*

Trait	*T. orientalis*	*T. latifolia*
Leaf lamina	50-118 × 1.5- 2.5cm, dark green in colour, T.S. linear-lanceolate to lanceolate (Figure 2)	50–105 × 1.0–1.5cm, light green in colour, T.S. semilunar (Figure 2)
Male flower	Usually 3 stimanate	Usually 2 stimanate
Female flower	Hairs on stalk as long as style, gynophore 2–2.5 mm long, ovary fusiform, stigma spatulate (Figure 2)	Hairs on stalk shorter than style, gynophore 3.5–4.0 mm long, ovary lanceolate, stigma lanceolate (Figure 2)
Fruit	Elliptic	Lanceolate

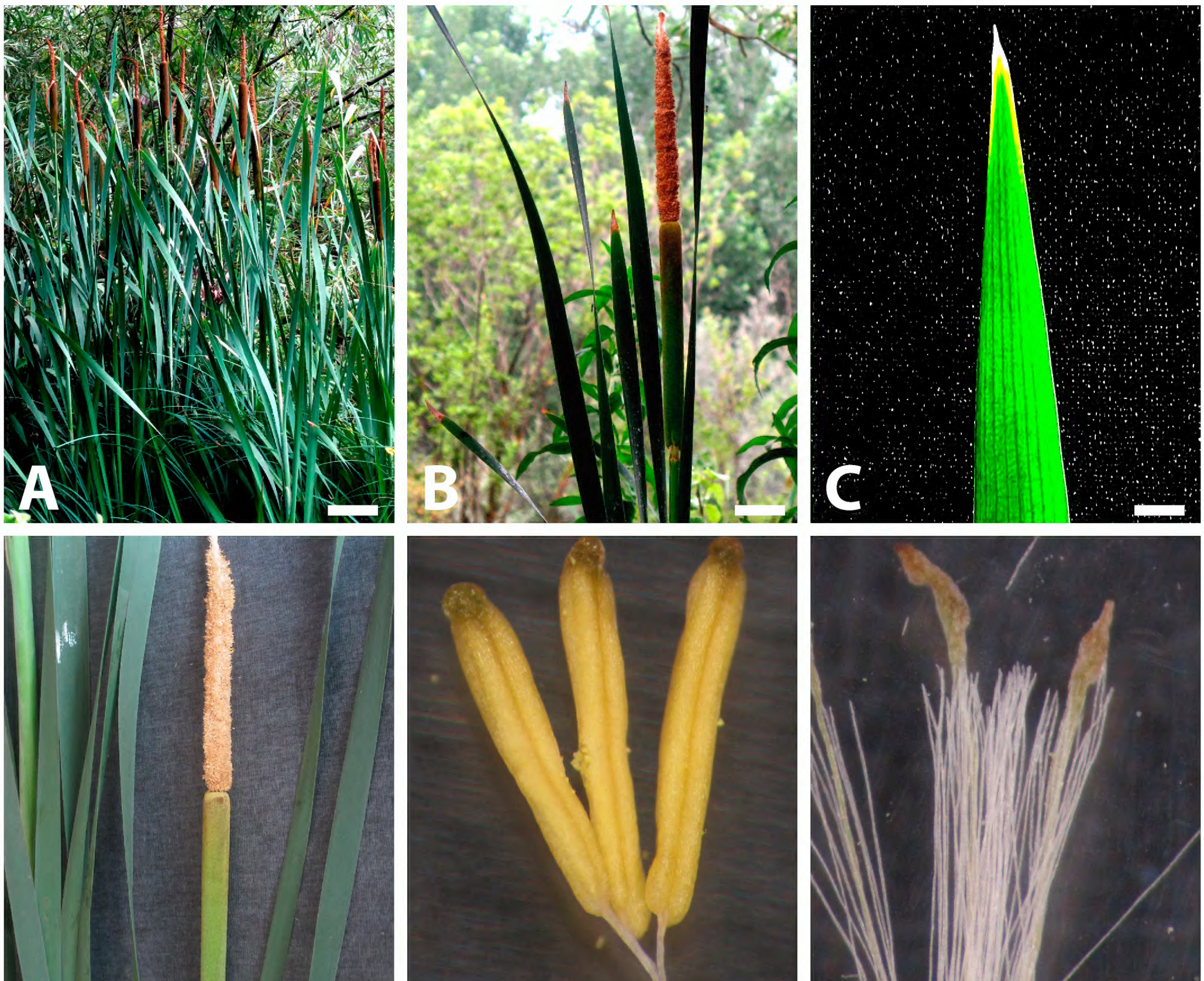

Figure 2: Vegetative and floral parts of *T. orientalis* **A:** Natural population (scale = 0.01 mm). **B:** Habit (scale = 0.02 mm) **C**: Leaf apical portion (scale = 0.06 mm). **D**: Inflorescence (scale = 0.1 mm). **E:** Male flower (scale = 10cm). **F**: Female flower; note hairs on stalk as long as style (scale = 7.5 cm). **G**: Female flower with spatulate stigm (scale = 9 cm). **H**: Carpel with gynophore (scale = 6.5 m). **I**: Fusiform ovary (scale = 20 cm).

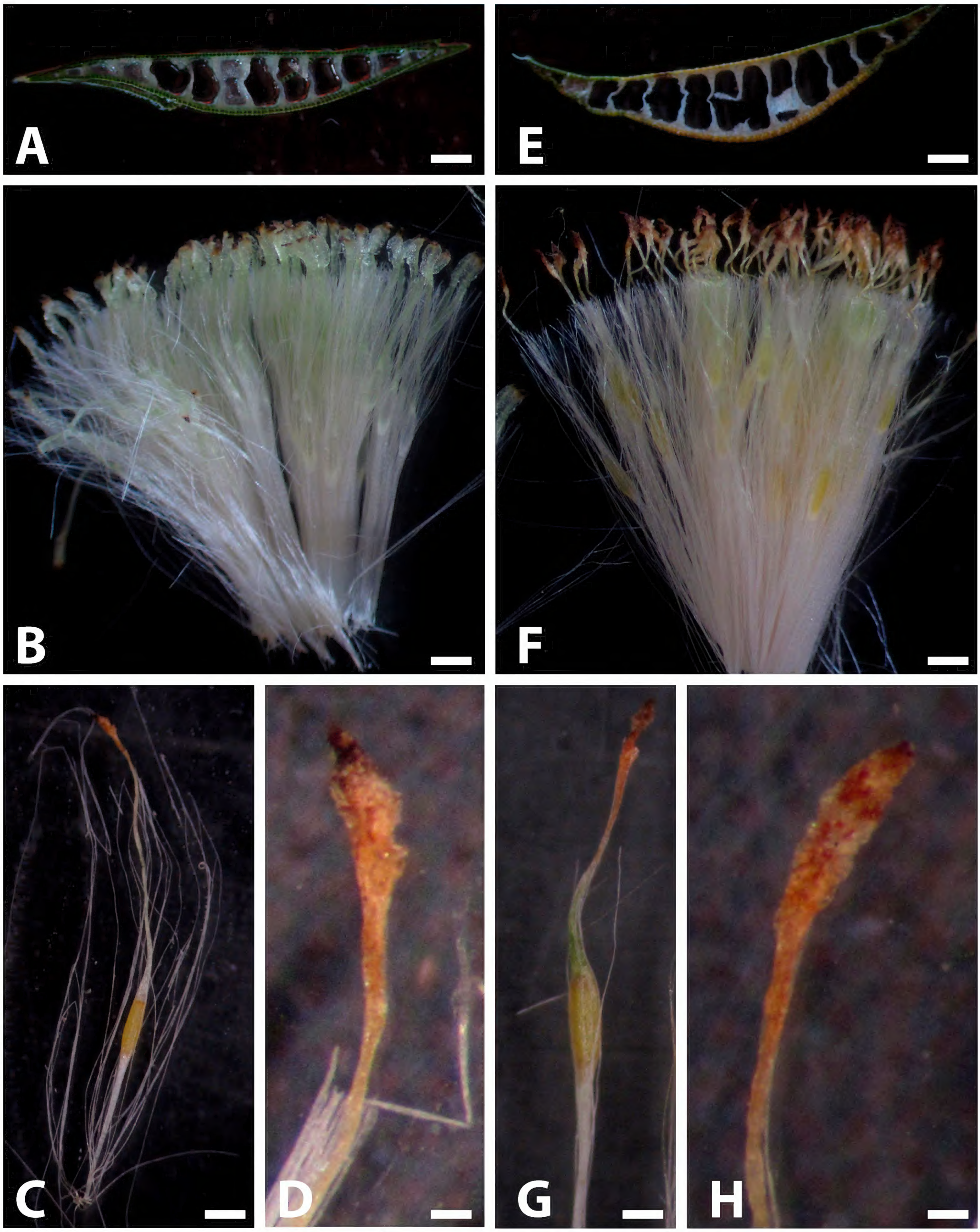

Figure 3. **A–D:** *Typha orientalis*. **A:** T.S. of leaf (scale = 2 cm). **B:** T.S. of female part of inflorescence; note hairs on stalk as long as style (scale = 2.5 cm). **C**: Female flower; note fusiform ovary and medium sized gynophore (scale = 3.7cm). **D**: Spathulate stigma (scale = 30 cm). **E–G:** *Typha latifolia*. **E**: T.S. of leaf (scale = 2 cm). **F:** T.S. of female part of inflorescence; note hairs on stalk shorter than style. **G**: Female flower; note lanceolate ovary and long gynophore (scale = 3.3 cm). **H**: Lanceolate stigma (scale = 25 cm).

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